TECHNICAL REPORT

ISO/IEC TR 15504-1

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Information technology — Software process assessment —

Part 1:
Concepts and introductory guide

Technologies de l'information — Évaluation des procédés du logiciel —

Partie 1: Concepts et guide introductif

Reference number
ISO/IEC TR 15504-1:1998(E)

Contents

Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.

In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

The main task of technical committees is to prepare International Standards, but in exceptional circumstances a technical committee may propose the publication of a Technical Report of one of the following types:

— type 1, when the required support cannot be obtained for the publication of an International Standard, despite repeated efforts;

— type 2, when the subject is still under technical development or where for any other reason there is the future but not immediate possibility of an agreement on an International Standard;

— type 3, when a technical committee has collected data of a different kind from that which is normally published as an International Standard ("state of the art", for example).

Technical Reports of types 1 and 2 are subject to review within three years of publication, to decide whether they can be transformed into International Standards. Technical Reports of type 3 do not necessarily have to be reviewed until the data they provide are considered to be no longer valid or useful.

ISO/IEC TR 15504-1, which is a Technical Report of type 2, was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology,* Subcommittee SC 7, *Software engineering*.

ISO/IEC TR 15504 consists of the following parts, under the general title *Information technology — Software process assessment*:

— *Part 1: Concepts and introductory guide*

— *Part 2: A reference model for processes and process capability*

— *Part 3: Performing an assessment*

— *Part 4: Guide to performing assessments*

— *Part 5: An assessment model and indicator guidance*

— *Part 6: Guide to competency of assessors*

— *Part 7: Guide for use in process improvement*

— *Part 8: Guide for use in determining supplier process capability*

— *Part 9: Vocabulary*

Introduction

Overview

ISO/IEC TR 15504 provides a framework for the assessment of software processes. This framework can be used by organizations involved in planning, managing, monitoring, controlling, and improving the acquisition, supply, development, operation, evolution and support of software.

ISO/IEC TR 15504 provides a structured approach for the assessment of software processes for the following purposes:

— by or on behalf of an organization with the objective of understanding the state of its own processes for process improvement;

— by or on behalf of an organization with the objective of determining the suitability of its own processes for a particular requirement or class of requirements;

— by or on behalf of one organization with the objective of determining the suitability of another organization's processes for a particular contract or class of contracts.

The framework for process assessment

— encourages self-assessment;

— addresses the adequacy of the management of the assessed processes;

— takes into account the context in which the assessed processes operate;

— produces a set of process ratings (a process profile) rather than a pass/fail result;

— is appropriate across all application domains and sizes of organization.

For an organization to improve product quality it must have a proven, consistent and reliable method for assessing the state of its processes and must have a means of using the results as part of a coherent improvement programme.

The use of process assessment within an organization should encourage

— the culture of constant improvement and the establishment of the proper mechanisms to support and maintain that culture;

— the engineering of processes to meet business requirements;

— the optimization of resources.

This will result in capable organizations that maximize their responsiveness to customer and market requirements, minimize the full life-cycle costs of their products and as a result maximize end-user satisfaction.

Purchasers will benefit from the use of process assessment. Its use in capability determination will

— reduce uncertainties in selecting suppliers of software intensive systems by enabling the risks associated with the contractor's capability to be identified before contract award;

— enable appropriate controls to be put in place for risk containment;

— provide a quantified basis for choice in balancing business needs, requirements and estimated project cost against the capability of competing suppliers.

The major benefits of a standardized approach to process assessment are that it will

— provide a public, shared approach for process assessment;

— lead to a common understanding of the use of process assessment for process improvement and capability evaluation;

— facilitate capability evaluation in procurement;

— be controlled and regularly reviewed in the light of experience of use;

— be changed only by international consensus;

— encourage harmonization of existing schemes.

The approach to process assessment defined in ISO/IEC TR 15504 is designed to provide a basis for a common approach to describing the results of process assessment, allowing for some degree of comparison of assessments based upon different but compatible models and methods. The sophistication and complexity required of a process is dependent upon its context. For instance the planning required for a five person project team is much less than for a fifty person team. This context influences how a competent assessor judges a practice when assessing its adequacy and influences the degree of comparability between process profiles.

Field of application

Process assessment has two principal contexts for its use, as shown diagrammatically in figure 1.

Within a process improvement context, process assessment provides the means of characterizing the current practice within an organizational unit in terms of the capability of the selected processes. Analysis of the results in the light of the organization's business needs identifies strengths, weaknesses and risks inherent in the processes. This, in turn, leads to the ability to determine whether the processes are effective in achieving their goals, and to identify significant causes of poor quality, or overruns in time or cost. These provide the drivers for prioritizing improvements to processes.

Process capability determination is concerned with analysing the proposed capability of selected processes against a target process capability profile in order to identify the risks involved in undertaking a project using the selected processes. The proposed capability may be based on the results of relevant previous process assessments, or may be based on an assessment carried out for the purpose of establishing the proposed capability.

Two of the parts of ISO/IEC TR 15504 (parts 7 and 8) address the use of process assessment for process improvement and for process capability determination. Other parts of ISO/IEC TR 15504 address various issues relating to process assessment.

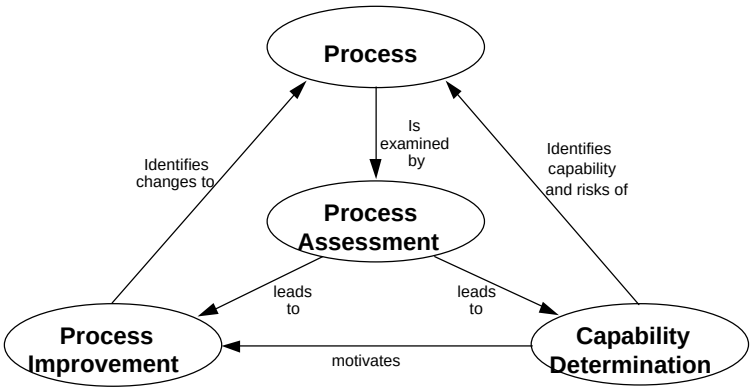

Figure 1 — Software Process Assessment

ISO/IEC TR 15504 has been designed to satisfy the needs of acquirers, suppliers and assessors, and their individual requirements from within a single source.

The benefits arising from the use of this suite of documents include

For **acquirers:**

— an ability to determine the current and potential capability of a supplier's software processes.

For **suppliers:**

— an ability to determine the current and potential capability of their own software processes;

— an ability to define areas and priorities for software process improvement;

— a framework that defines a road map for software process improvement.

For **assessors:**

— a framework for conducting assessments.

ISO/IEC TR 15504 is not intended to be used in any scheme for the certification/registration of the process capability of an organization.

Components of ISO/IEC TR 15504

ISO/IEC TR 15504 is composed of nine parts. This clause describes each of the parts and its role within ISO/IEC TR 15504.

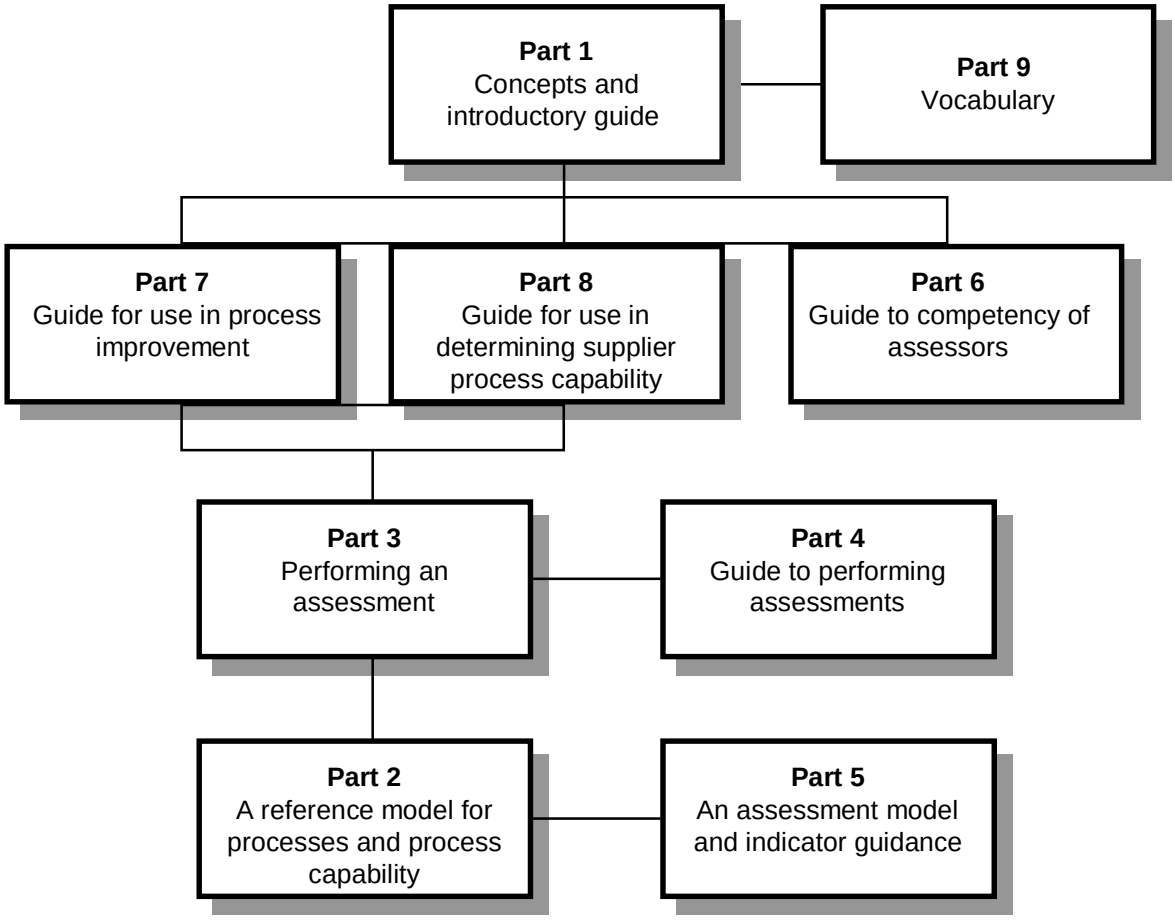

Figure 2 — Components of ISO/IEC TR 15504

Figure 2 shows a potential road map for users of ISO/IEC TR 15504. Part 1 (this document) provides a general entry point to ISO/IEC TR 15504. Readers with specific interest in either process improvement or supplier capability determination should then read parts 7 or 8 as appropriate for detailed guidance on these contexts of use. These parts will enable the user to identify the appropriate usage of the normative components of ISO/IEC TR 15504 (parts 2 and 3). Part 4 provides guidance on the application of part 2 and part 3 while part 5 is an exemplar assessment model compatible with the reference model (part 2). Users with a primary interest in the role of the assessor are directed to part 6 where guidance on the skills and competencies of assessors can be found.

Table 1 identifies the principal classes of reader for ISO/IEC TR 15504 and shows where their primary areas of interest are addressed within the document set.

Table 1 — Readership of ISO/IEC TR 15504

Class of Reader	Interests	Suggested parts to be read
Assessment Sponsor	How an assessment is conducted, what tools and other support are required, how to initiate an assessment.	1, 2, 3, 4, 6
Process Improvement Sponsor	Initiating an improvement programme, defining assessment inputs for an assessment for improvement purposes, using assessment results for improvement.	7
Process Capability Determination Sponsor	Initiating a programme for the determination of supplier capability, defining a target capability profile, verifying and using assessment results in a capability determination exercise.	8
Assessors	Conducting a conformant assessment, developing the skills and competencies needed to perform an assessment.	2, 3, 4, 5, 6
Developers of Assessment Models	Developing a model for performing assessments that is compatible with the reference model.	2, 3, 4, 5
Developers of Assessment Methods	Developing a method that will support the performance of conformant assessments.	2, 3, 4
Tool Developers	Developing tools that will support assessors by collecting, recording and classifying evidence in the performance of assessments.	2, 3, 4, 5

Part 1 (informative) is an entry point into ISO/IEC TR 15504. It describes how the parts of the suite fit together, and provides guidance for their selection and use. It explains the requirements contained within ISO/IEC TR 15504 and their applicability to the performance of an assessment.

Part 2 (normative) of ISO/IEC TR 15504 defines a two dimensional reference model for describing processes and process capability used in a process assessment. The reference model defines a set of processes, defined in terms of their purpose and outcomes, and a framework for evaluating the capability of the processes through assessment of process attributes structured into capability levels. Requirements for establishing the compatibility of different assessment models with the reference model are defined.

Part 3 (normative) of ISO/IEC TR 15504 defines the requirements for performing an assessment in such a way that the outcomes will be repeatable, reliable and consistent.

Part 4 (informative) of ISO/IEC TR 15504 provides guidance on performing software process assessments, interpreting the requirements of ISO/IEC TR 15504-2 and ISO/IEC TR 15504-3 for different assessment contexts. The guidance covers the selection and use of a documented process for assessment; of a compatible assessment model(s); and of a supporting assessment instrument or tool. This guidance is generic enough to be applicable across all organizations, and also for performing assessments using a variety of different methods and techniques, and supported by a range of tools.

Part 5 (informative) of ISO/IEC TR 15504 provides an exemplar model for performing process assessments that is based upon and directly compatible with the reference model in ISO/IEC TR 15504-2. The assessment model(s) extend the reference model through the inclusion of a comprehensive set of indicators of process performance and capability.

Part 6 (informative) of ISO/IEC TR 15504 describes the competence, education, training and experience of assessors that are relevant to conducting process assessments. It describes mechanisms that may be used to demonstrate competence and to validate education, training and experience.

Part 7 (informative) of ISO/IEC TR 15504 describes how to define the inputs to and use the results of an assessment for the purposes of process improvement. The guide includes examples of the application of process improvement in a variety of situations.

Part 8 (informative) of ISO/IEC TR 15504 describes how to define the inputs to and use the results of an assessment for the purpose of process capability determination. It addresses process capability determination in both straightforward situations and in more complex situations involving, for example, future capability. The guidance on conducting process capability determination is applicable either for use within an organization to determine its own capability, or by an acquirer to determine the capability of a (potential) supplier.

Part 9 (normative) is a consolidated vocabulary of all terms specifically defined for the purposes of ISO/IEC TR 15504.

Relationship to other International Standards

ISO/IEC TR 15504 is complementary to several other International Standards and other models for evaluating the capability and effectiveness of organizations and processes. This section describes the relationship between ISO/IEC TR 15504 and the major related International Standards.

ISO/IEC TR 15504 incorporates the intent of the ISO 9000 series to provide confidence in a supplier's quality management whilst providing acquirers with a framework for assessing whether potential suppliers have the capability to meet their needs. Process assessment provides users with the ability to evaluate process capability on a continuous scale in a comparable and repeatable way, rather than using the pass/fail characteristic of quality audits based on ISO 9001. In addition, the framework described in ISO/IEC TR 15504 provides the opportunity to adjust the scope of assessment to cover specific processes of interest, rather than all of the processes used by an organizational unit.

ISO/IEC TR 15504 is related in particular to the following components of the ISO 9000 series:

— ISO 9001:1994, *Model for quality assurance in design, development, production, installation and servicing;*

— ISO 9000-3:1997, *Quality management and quality assurance standards — Part 3: Guidelines for the application of ISO 9001:1994 to the development, supply, installation and maintenance of computer software;*

— ISO 9004-4:1993, *Quality management and quality system elements — Part 4: Guidelines for quality improvement.*

ISO/IEC TR 15504, and particularly part 2, is directly aligned to

— ISO/IEC 12207:1995, *Information technology — Software life cycle processes.*

ISO/IEC TR 15504 provides an overall contextual framework for software life cycle processes, and the process dimension of the reference model is closely mapped to this framework.

Information technology — Software process assessment —

Part 1:
Concepts and introductory guide

1 Scope

This part of ISO/IEC TR 15504 provides overall information on the concepts of software process assessment and its use in the two contexts of process improvement and process capability determination. It describes how the parts of the suite fit together, and provides guidance for their selection and use. It explains the requirements contained within ISO/IEC TR 15504, and their applicability to performing assessments.

Readers of this guide should familiarize themselves with the terminology and structure of the document suite, and then reference the appropriate parts of the suite for the context in which they propose to conduct an assessment. If the assessment is to be conducted for the purposes of internal process improvement within an organization, the relevant context is described in ISO/IEC TR 15504-7. If the results of the assessment are to be used for the purposes of determining the process capability of the organizational unit in the context of a specified requirement, the guidance is in ISO/IEC TR 15504-8.

More detailed description of the use of ISO/IEC TR 15504 is given in clause 4.

2 Normative reference

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO/IEC TR 15504. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO/IEC TR 15504 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO/IEC TR 15504-9:1998, *Information technology — Software process assessment — Part 9: Vocabulary.*

3 Terms and definitions

For the purposes of this part of ISO/IEC TR 15504, the terms and definitions given in ISO/IEC TR 15504-9 apply.

4 Overview

4.1 General

ISO/IEC TR 15504 provides a framework for the assessment of software processes. This framework can be used by organizations involved in planning, managing, monitoring, controlling and improving the acquisition, supply, development, operation, evolution and support of software.

Process assessment examines the processes used by an organization to determine whether they are effective in achieving their goals. The assessment characterizes the current practice within an organizational unit in terms of the capability of the selected processes. The results may be used to drive process improvement activities or

process capability determination by analyzing the results in the context of the organization's business needs, identifying strengths, weaknesses and risks inherent in the processes.

The documents provide a structured approach to software process assessment for the following purposes:

a) by or on behalf of an organization with the objective of understanding the state of its own processes for process improvement;

b) by or on behalf of an organization with the objective of determining the suitability of its own processes for a particular requirement or class of requirements;

c) by or on behalf of one organization with the objective of determining the suitability of another organization's processes for a particular contract or class of contracts.

The high level view of the relationships between process assessment, process improvement and process capability determination is shown in figure 3, along with an indication of the places of the various components of ISO/IEC TR 15504 in the processes.

An assessment may be used for purposes of either Process Improvement or Capability Determination. Guidance on such usage is found in ISO/IEC TR 15504-7 and ISO/IEC TR 15504-8 respectively. Performance of an assessment requires a model (or models) compatible with the reference model in ISO/IEC TR 15504-2; an exemplar model is provided in ISO/IEC TR 15504-5. The assessment process must be documented and should be based upon a method in line with the requirements defined in ISO/IEC TR 15504-3 and following the guidance provided in ISO/IEC TR 15504-4. A competent assessor is charged with ensuring that the assessment is conformant; guidance for the necessary skills and competencies are in ISO/IEC TR 15504-6.

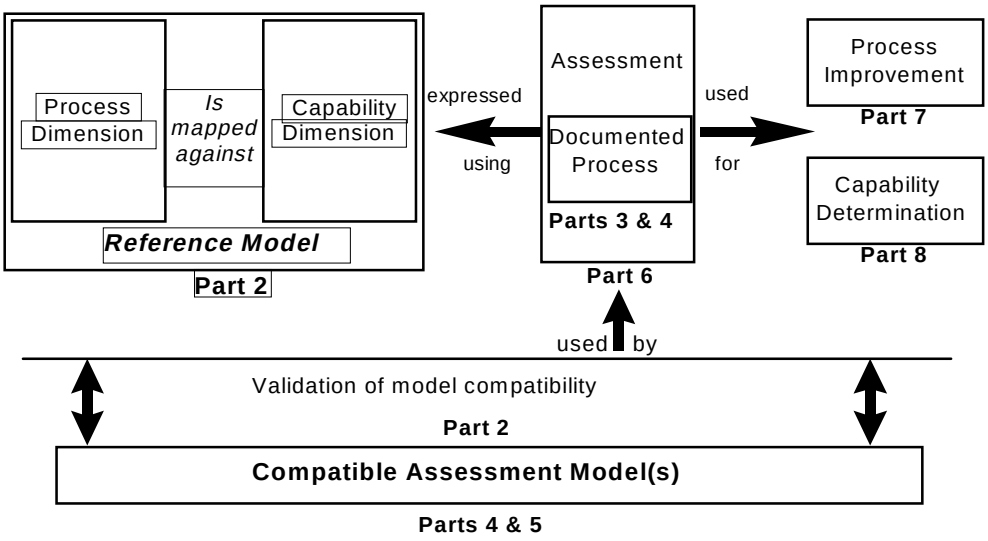

Figure 3 — Overview of relationships of elements of ISO/IEC TR 15504

ISO/IEC TR 15504 is designed to provide assessment results that are repeatable, objective, comparable within similar contexts, and able to be used for either process improvement or process capability determination.

The framework for the conduct of assessments is designed to support the achievement of dependable assessment results. The framework includes an architecture for rating processes and for presenting assessment ratings. The assessment framework also provides guidance on the conduct of the assessment. ISO/IEC TR 15504 provides guidance in the contexts of both process improvement and process capability determination. It further provides a definition of the required skills and experience for assessors.

This section describes how to use the other parts of ISO/IEC TR 15504 to conduct process assessments and make effective use of their results. The key determinant in the use of ISO/IEC TR 15504 is the purpose for which the assessment is being conducted. This may be:

— to promote an understanding of the software process;

— to support process improvement;

— to support process capability determination.

4.2 The assessment framework

4.2.1 The context of process assessment

The context of a process assessment is summarized in figure 4. ISO/IEC TR 15504-2 defines a reference model that provides a basis for rating the capability of processes, based on their achievement of defined process attributes. ISO/IEC TR 15504-3 defines the requirements for performing an assessment and sets out the circumstances under which assessment results may be compared. ISO/IEC TR 15504-4 provides guidance on performing an assessment and interpreting the requirements in ISO/IEC TR 15504-3. This guidance is generic enough to be applicable across all organizations, and for conducting assessments using a variety of methods, techniques and tools.

Process assessment is performed either during a process improvement initiative as described in ISO/IEC TR 15504-7, or as part of a process capability determination exercise as described in ISO/IEC TR 15504-8. In either case, the formal entry to the assessment processes occurs with the assessment sponsor's commitment to proceed. The assessment input may then be compiled. The assessment input defines the purpose of the assessment (why it is being carried out), the scope of the assessment, and what constraints, if any, apply to the assessment. The assessment input also defines the responsibilities for carrying out the assessment.

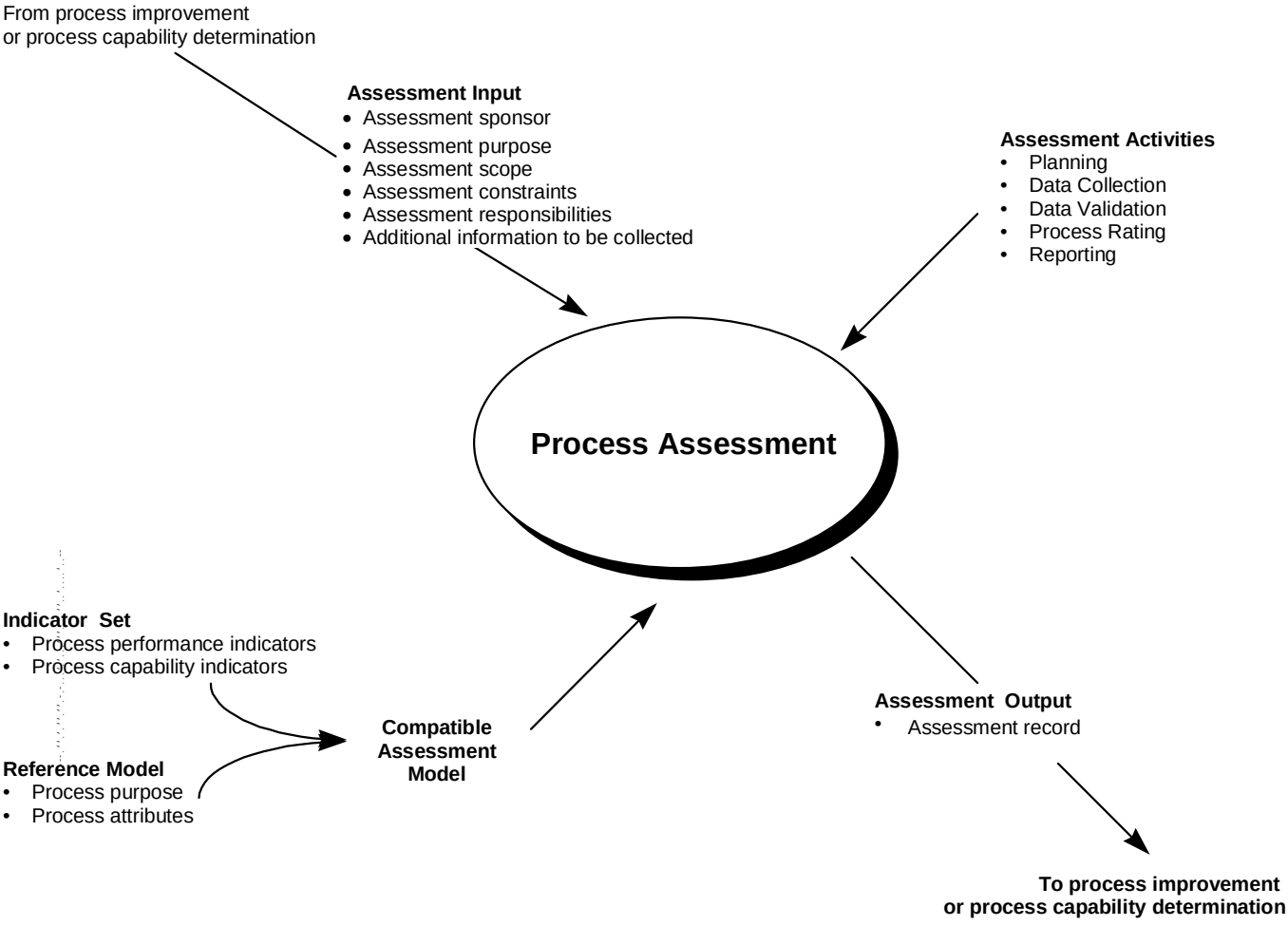

Figure 4 — Context of process assessment

An assessment is carried out by assessing selected processes against the assessment model(s) selected for the assessment. This assessment model(s) have to be compatible with the reference model defined in ISO/IEC TR 15504-2. This two-dimensional model consists of a set of processes and a set of process attributes. The process attributes apply across all processes. They are grouped into capability levels that may be used to determine the capability of the process. The assessment output includes a set of process profiles and optionally a capability level rating for each process assessed.

The assessment process contains at least five specified activities: planning, data collection, data validation, process rating, and reporting. The assessment process must be documented; in addition, the assessors must record the objective indicators of performance or capability used to justify the ratings. The process assessment is carried out either by a team with at least one competent assessor who has the competencies described in ISO/IEC TR 15504-6; or, on a continuous basis using suitable tools for data collection and validated by a competent assessor.

4.2.2 An architecture for software processes

ISO/IEC TR 15504-2 defines a reference model of processes and process capability that forms the basis for any model to be used for the purposes of process assessment. The reference model comprises a two-dimensional approach to the evaluation of process capability - one dimension defines the processes to be assessed, the other describes the scale for measurement of capability. Any model(s) compatible with the reference model may be used for assessment, and the results of any conformant assessments will be able to be translated into a common base.

Each process in the reference model is described by a statement of the purpose of the process, which includes an outline of the intended outcomes of process implementation. Processes are grouped into five process categories as shown in the table below.

Table 2 — Description of process categories

Process category	Brief description
Customer-Supplier	Processes that directly impact the customer, support development and transition of the software to the customer, and provide for the correct operation and use of the software product and/or service.
Engineering	The Engineering process category consists of processes that directly specify, implement, or maintain the software product, its relation to the system, and its customer documentation. In circumstances where the system is composed totally of software, the Engineering processes deal only with the construction and maintenance of such software.
Support	Processes that may be employed by any of the other processes (including other supporting processes) at various points in the software life cycle.
Management	Processes that contain generic practices that may be used by anyone who manages any type of project or process within a software life cycle.
Organization	Processes that establish the business goals of the organization and develop process, product, and resource assets that, when used by the projects in the organization, will help the organization achieve its business goals.

Evolving process capability is expressed in terms of process attributes, which are in turn grouped into a series of capability levels. Each capability level represents an incremental evolution in the management and control of the processes, so that the assessment models provide a road map for increasing capability.

The capability dimension defines a scale of five levels of capability characterised by a set of nine process attributes. Figure 5 below shows the two dimensional structure of the reference model defined in ISO/IEC TR 15504-2.

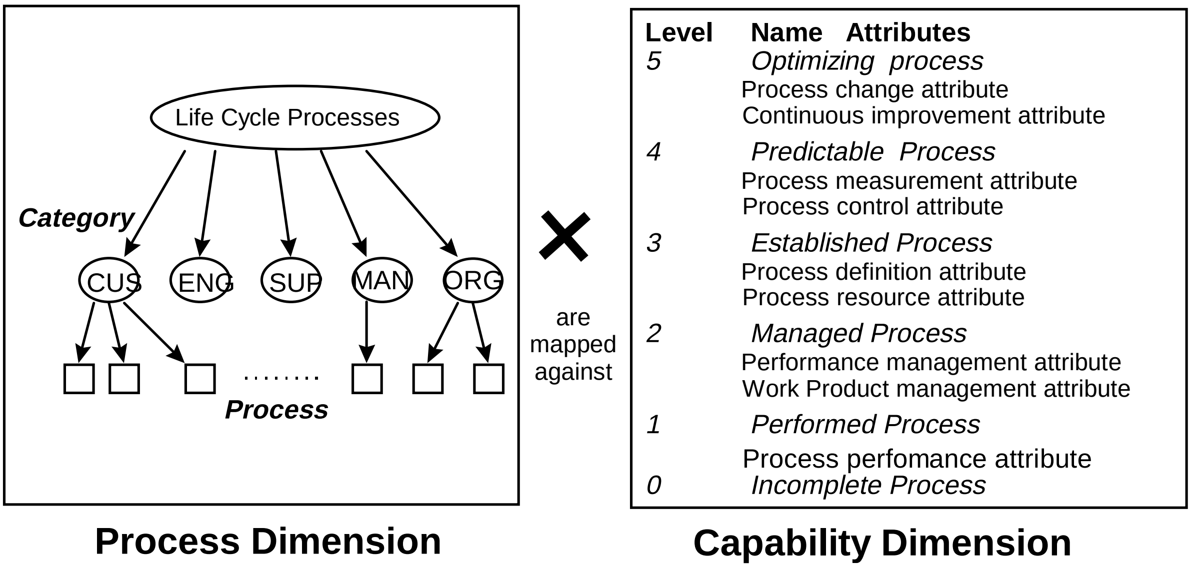

Figure 5 — The dimensions of the reference model

4.2.3 Assessment indicators

In order to maximize the repeatability, reliability and consistency of assessments documented evidence justifying the ratings of process capability must be recorded and retained. This evidence is in the form of indicators of process performance and capability, which typically take the form of objectively demonstrated characteristics of work products and practices associated with the processes assessed. A complete model for process assessment contains details of the indicators to be used.

The simplest way in which such indicators can be documented is through the use of some form of assessment instrument. Instruments may be designed for manual operation (for example, in the forms of checklists or questionnaires), or for automated operation. ISO/IEC TR 15504-3 includes requirements concerning the availability and use of indicators during the assessment. Guidance for the selection and use of assessment instruments and tools is included in ISO/IEC TR 15504-4.

4.3 Competency of assessors

The Competent Assessor in a team has the pivotal role of ensuring that other team members collectively have the right blend of specialized knowledge and assessment skills. The competent assessor provides the necessary guidance to the team, and helps to moderate the judgments and ratings made by the other members of the team to ensure consistency of interpretation.

ISO/IEC TR 15504-6 is concerned with assessor competencies and appropriate education, training and experience, and includes mechanisms that may be used to demonstrate competence and to validate that education, training and experience.

4.4 Process improvement context

Successful software process improvement occurs in a business context by addressing specific needs and business goals of the organization, and by understanding the key constraints such as resources, culture, etc. that are clearly stated and understood.

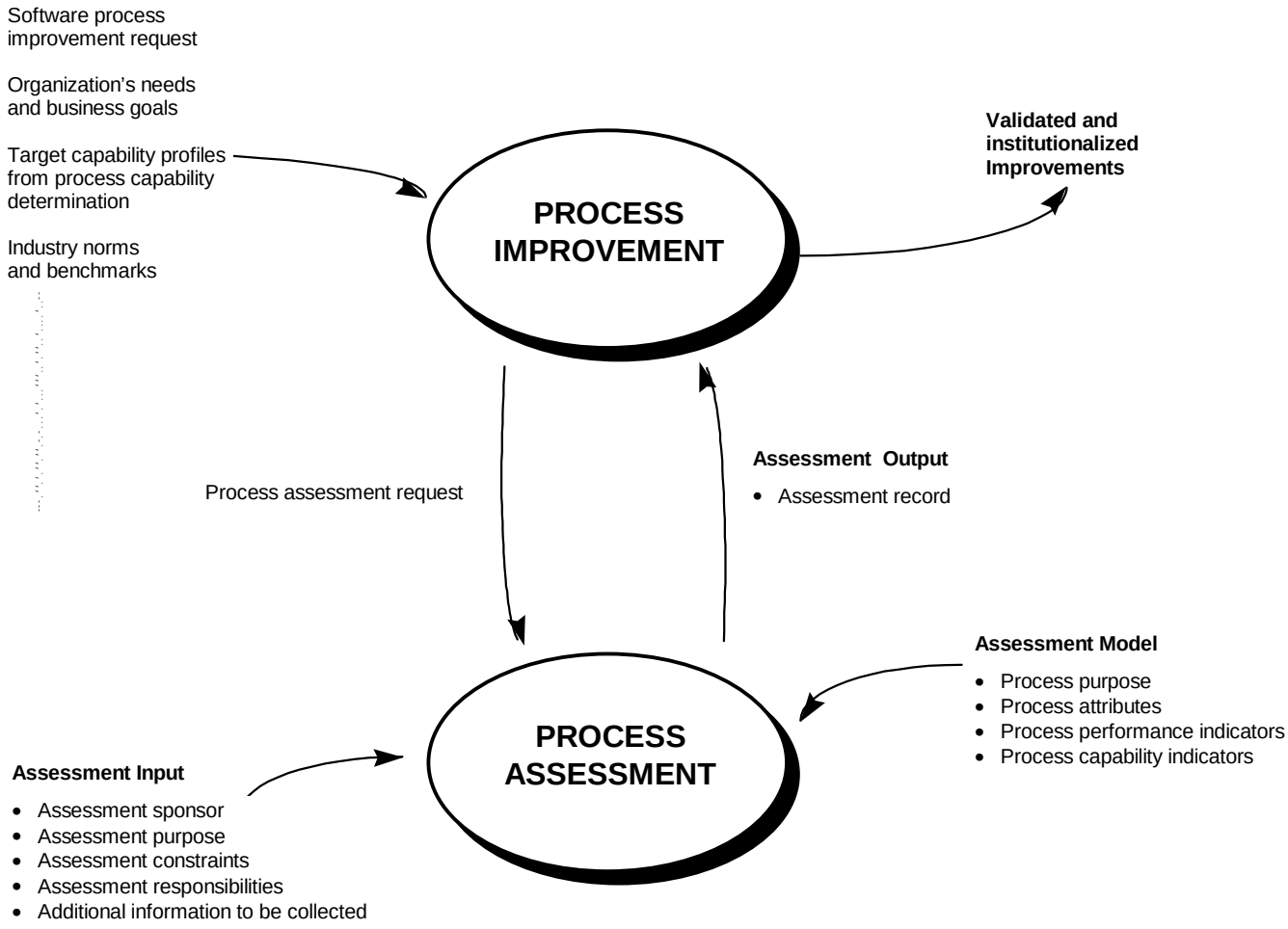

Figure 6 — Process improvement

ISO/IEC TR 15504-7 provides guidance on using software process assessment as part of a complete framework and method for performing software process improvement in a continuous cycle although there is no reason why the organization could not employ the guidance for a single cycle of improvement activity. The overall context of process improvement is shown in figure 6. The guidance covers:

— invoking a software process assessment;

— using the results of a software process assessment;

— measuring software process effectiveness and improvement effectiveness;

— identifying improvement actions aligned to business goals;

— using the reference model in ISO/IEC TR 15504-2 as a framework for improvement;

— cultural issues in the context of software process improvement;

— dealing with management issues for software process improvement.

The guidance provided builds directly on ISO 9004-4. It does not presume specific organizational structures, management philosophies, software life cycle models or software development methods. The concepts and principles are appropriate for the full range of different business needs, application domains and size of organization, so that they may be used by all types of software organizations to guide their improvement activities.

4.5 Process capability determination context

The procedure for process capability determination is described in ISO/IEC TR 15504-8. Process capability determination is mainly built upon process assessment as described in the ISO/IEC TR 15504-3. Processes are rated against an assessment model or models compatible with the reference model defined in ISO/IEC TR 15504-2, and results are expressed using the measurement and rating framework included in the reference model. The context of process capability determination is shown in figure 7.

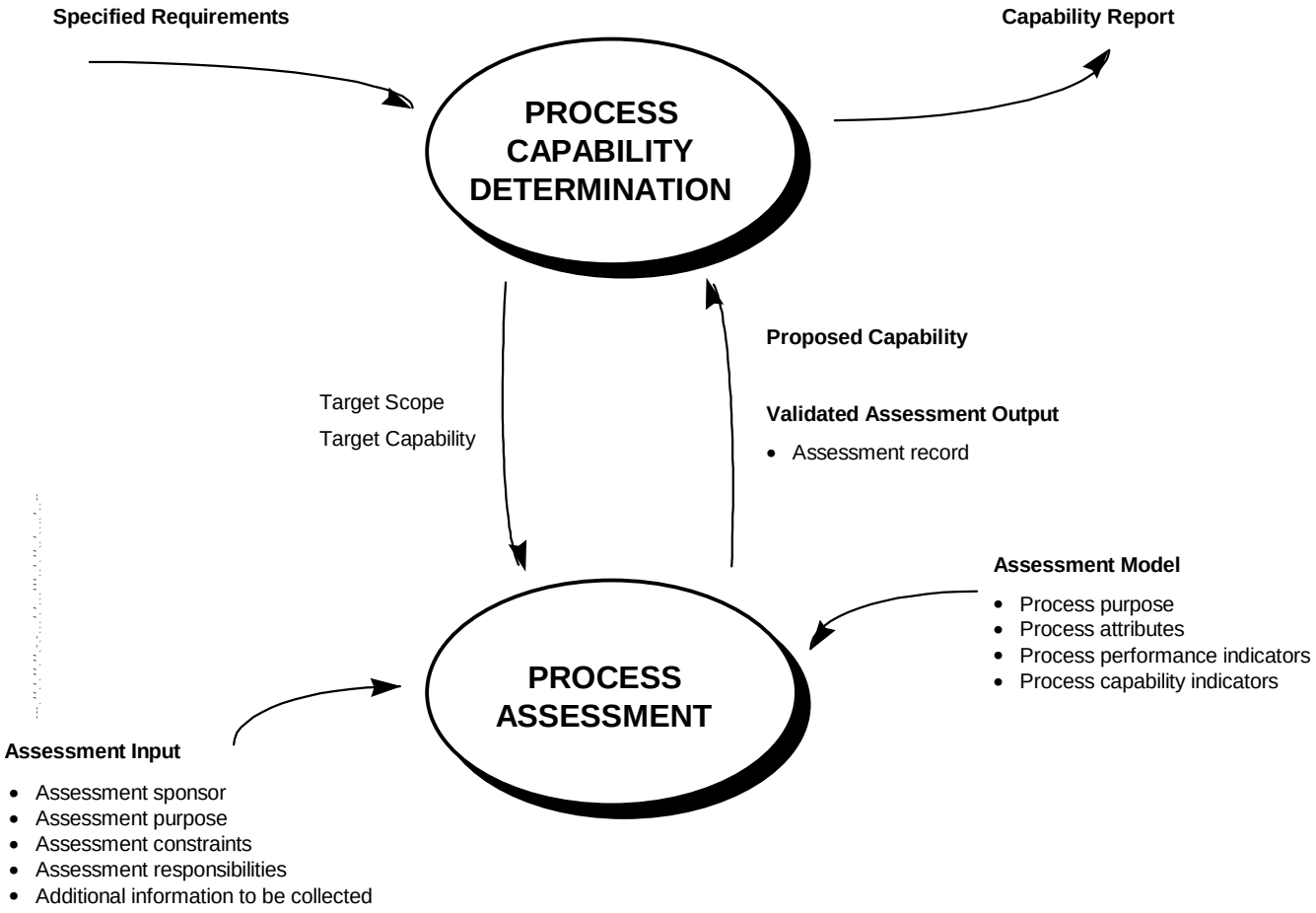

Figure 7 — Process capability determination

An acquirer of software products or services has technical and other needs as expressed in the specified requirements. Before making a contract the acquirer may need to determine the process capability of the prospective contractor, or a supplier may want to ascertain its own process capability before responding to an acquirer's request for proposal. The technical and other needs for process capability determination are documented in the specified requirements.

The specified requirement is translated into a target capability that represents the required process capability, and process assessment input that will scope the process assessment. The supplier may put forward a proposed process capability as a set of process-by-process capability level ratings to be offered by the organizational unit concerned. In a straightforward situation, the proposed process capability may be based on a recent self-assessment or by other means. In more complex cases, a supplier may propose a process capability to be achieved in the future based on the supplier's current profile and relevant improvement plans, backed up if possible with improvement records, or a constructed capability including the capability of one or more sub-contractors or partners.

The credibility of the proposed process capability is analyzed together with the risks involved and reported in the process capability report.

ISO/IEC TR 15504-8 provides guidance on how to use the results of an assessment for the purpose of determining the process capability of suppliers. It specifically addresses process capability determination both for use within an organization to determine the risks associated with undertaking a new project (sometimes called first party use) and for use by an acquirer for assessing external suppliers (sometimes called second party or contractual use).

5 Conformance

ISO/IEC TR 15504 contains two principal areas where conformance may be claimed: in the conduct of a software process assessment; and in the construction of models for assessment compatible with the reference model. This clause explains the nature of conformance in these two areas.

Requirements for the conduct of an assessment are contained in ISO/IEC TR 15504-3. Subclause 5.1 provides further information on the performance of assessments. Requirements for developing assessment model(s) compatible with the reference model are contained in ISO/IEC TR 15504-2. Subclause 5.2 provides further information regarding these requirements.

5.1 Performing software process assessments

5.1.1 Overview of the requirements

This guidance describes how to perform assessments in such a way that conformance to the requirements can be readily demonstrated.

The requirements, set out in clause 4 of ISO/IEC TR 15504-3, for performing a software process assessment are designed to ensure that the results are reliable, consistent and repeatable. This is important where an organization wishes to compare its assessment results with those of other similar organizations. It is especially important in process capability determination in a contractual situation where competing or collaborating suppliers are being compared.

In general terms, an assessment meeting the requirements of ISO/IEC TR 15504 is one which:

— uses an assessment process that at minimum meets the requirements specified in ISO/IEC TR 15504-3;

— is based on an assessment model(s) that is compatible with the reference model defined in ISO/IEC TR 15504-2 for the processes assessed;

— uses a comprehensive set of indicators of process performance and capability;

— produces process profiles using the process attribute rating scheme defined in ISO/IEC TR 15504-2; and

— has objective evidence retained that demonstrates that the above conditions have been met.

5.1.2 Responsibilities

The competent assessor is responsible for ensuring that the requirements for conducting an assessment are met. The sponsor of the assessment will normally be the party requiring that the assessment conforms to the requirements.

When a decision is taken to perform an assessment, the sponsor of the assessment should be responsible for defining the purpose of the assessment.

The sponsor is also responsible for verifying that the assessor has the necessary competence and skills to perform or oversee the assessment. Guidance on verification is included in ISO/IEC TR 15504-6. The identity of the competent assessor is part of the assessment input.

5.1.3 The assessment inputs

When performing an assessment, the competent assessor is responsible for ensuring that the requirements for this process are followed and documented. Specific requirements cover documenting:

— The identity of the assessment sponsor ;

— the assessment purpose;

— the assessment scope;

— any assessment constraints;

— the assessment responsibilities;

— any additional information to be collected for process improvement or capability determination.

Some of the items - particularly assessment scope and constraints - contain a number of elements, and care must be taken to ensure that all of these have been addressed.

Guidance on reviewing the inputs of an assessment is contained in ISO/IEC TR 15504-4. The assembly of the inputs themselves will depend on the purpose of the assessment, and guidance is contained in ISO/IEC TR 15504-7 and ISO/IEC TR 15504-8. Documentation of the assessment inputs should be retained in the assessment record, and traceability provided to ensure that it can be verified that the necessary reviews have been performed.

5.1.4 Selecting processes for assessment

The assessment scope sets out which of the organizational unit's processes are to be assessed. The model(s) used as the basis for performing the assessment must be compatible with the reference model, and it is required that correspondence is established between the processes in the organizational unit and the reference model, through the use of the assessment model(s). Defining the scope in this way ensures that there is a common basis for rating and measurement.

The requirements for identifying processes for the assessment are set out in ISO/IEC TR 15504-3. Guidance on selecting a compatible model(s), on mapping to the defined processes, and for rating the processes assessed should be provided by the documented assessment process employed; guidance on selecting and using a documented assessment process is contained in ISO/IEC TR 15504-4.

Apart from guiding the assessment, the mapping of organizational processes to the compatible model(s) forms an essential part of the assessment record. It should be possible, after the assessment has been completed, for any person examining the assessment record to be able to relate the mapping to records of organizational structure, procedures, and standards within the assessed organization.

5.1.5 Assessment indicators

The use of an appropriate set of indicators during an assessment is a key component of the requirements of ISO/IEC TR 15504. Indicators of process performance and capability form an objective basis on which judgments of process attribute ratings can be founded. It is this objective basis for judgment that is the foundation of any comparisons of assessment results.

ISO/IEC TR 15504-3 contains a number of separate requirements relating to indicators. These are that

a) a compatible model must contain a comprehensive set of indicators covering both dimensions of the reference model for all processes in the assessment scope;

b) the indicators must be used during the assessment to support the assessors' judgement in rating process attributes;

c) evidence based on the indicators that supports the assessors' judgment of process attribute ratings must be recorded and maintained.

The simplest way in which these requirements can be met is for the elements of the compatible model - including the indicators - to be embedded in an appropriate instrument or tool, that permits the recording of observations and evidence throughout the assessment. ISO/IEC TR 15504-4 contains guidance on the selection and use of assessment instruments and tools.

5.1.6 Reporting assessment results

One of the main reasons for conducting a conformant assessment is to ensure comparability with other assessment outputs. This is made possible by implementing the requirements for rating processes and calculating results within the measurement framework, and reporting them in a way that makes the results of the calculation obvious.

The results of an assessment formally comprise a set of process attribute ratings for each process in the assessment scope. The set of process attribute ratings is termed the process profile. Additional information on the context of the assessment and of the processes assessed must also be recorded as part of the assessment record; requirements for recording the assessment outputs are contained in ISO/IEC TR 15504-3. Attribute ratings may be used to calculate a capability level rating for the assessed process.

Whatever the final format of the process output, it is essential that clear traceability to the processes and process attributes contained in the reference model is provided, to enable the process of calculation to be verified. A clear mechanism for the translation of results has to be provided by the developer of a compatible model, and this mechanism should ensure that such traceability is achieved.

It should be noted that assessment output contains full details of the process context in the assessment record. This record will also include additional information collected as part of the assessment, and required as inputs to the process improvement or process capability determination activities to follow on from assessment.

5.2 Developing a compatible model

ISO/IEC TR 15504-2 provides a reference model for process assessment. The reference model identifies critical attributes that a process should have to be considered complete and effective, but without unduly constraining the implementation of the process.

Assessment models may be built that address the unique needs of an industry sector or organization by addressing the requirements for compatibility contained in clause 7 of ISO/IEC TR 15504-2. Compatible models may be developed by organizations for their own internal use; by acquirers of software systems for use in specific acquisition situations; or by professional organizations defining requirements for specific application domains or use situations.

The requirements for constructing compatible models are set out in ISO/IEC TR 15504-2. There must be a clear and unambiguous mapping from the elements in a compatible model to the basic elements of the reference model - the processes and process attributes. The model must contain a set of indicators of process performance and capability. Finally, there must be a mechanism for translating the results of assessments performed with the model to the form defined in ISO/IEC TR 15504-2.

Bibliography

These references provide background information on the theoretical and practical applications of software process assessment. They are for information purposes only, and should not be taken as implying support for any or all of the approaches described. The list of references is limited to material that has been published officially and is available widely.

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